

I claim:

1. A motor starting device for a single-phase split-capacitor induction motor connected to a source of alternating current voltage, the motor having a run winding, a start winding, and a start capacitor, the starting device comprising:
  - 5 a. an auxiliary start capacitor;
  - b. a switching device comprising:
    - i. a switch which, when closed, connects the auxiliary start capacitor in parallel with the start capacitor;
    - ii. a switch activation circuit for opening and closing the switch;
  - 10 c. a rectifier connected through the motor windings to the source of alternating current voltage for producing a source of direct current voltage when the source of alternating current voltage is connected to the motor;
  - d. a control circuit connected to the source of direct current voltage and connected to the switch activation circuit for selectively energizing and deenergizing the switch activation circuit; and
  - 15 e. a switch protection circuit connected to the auxiliary start capacitor for maintaining the source of direct current voltage connected to the control circuit when the source of alternating current voltage is disconnected from the motor.
2. The motor starting device of Claim 1, wherein the switch protection circuit further  
20 comprises diodes connected to the start capacitor and the auxiliary start capacitor in order to conduct charge from either the start capacitor or the auxiliary start capacitor to the control circuit after the source of alternating current voltage is disconnected from the motor.
3. The motor starting device of Claim 1, wherein the control circuit energizes the switch  
25 activation circuit after a delay time from the connection of the source of alternating current voltage to the motor and wherein the control circuit maintains the switch activation circuit energized as long as charge exists on the start capacitor or the auxiliary start capacitor after the source of alternating current voltage is disconnected from the motor, wherein the control circuit further comprises:
  - 30 a. a timer/voltage sensor circuit having an input connected to the source of direct current voltage and an output, the timer/voltage sensor circuit comprising:

- i. a timer for measuring the time after the alternating current voltage is connected to the motor;
    - ii. a voltage sensor for determining the value of the voltage of the source of direct current voltage;
    - 5      iii. an interconnection between the voltage sensor and the timer so that the timer is adjusted based on the value of the voltage of the source of direct current voltage; and
    - iv. an output signal present on the output of the timer/voltage sensor circuit at the end of the elapsed time; and
  - 10      b. a switch activation circuit driver connected to the output of the timer/voltage sensor circuit for energizing the switch activation circuit in response to the output signal from the timer/voltage sensor circuit after the elapsed time.
4. The motor starting device of Claim 3, wherein the timer/voltage sensor circuit further includes a the manual adjustment for varying the elapsed time.
- 15      5. The motor starting device of Claim 3, wherein the switch activation circuit driver is a multivibrator.

6. A motor starting device for a single-phase split-capacitor induction motor connected to a source of alternating current voltage, the motor having a run winding, a start winding, and a start capacitor, the starting device comprising:
- 5 a. an auxiliary start capacitor;
- b. a switching device comprising:
- i. a switch which, when closed, connects the auxiliary start capacitor in parallel with the start capacitor;
- 10 ii. a switch activation circuit for opening and closing the switch;
- c. a rectifier connected through the motor windings to the source of alternating current voltage for producing a source of direct current voltage when the source of alternating current voltage is connected to the motor;
- d. a control circuit connected to the source of direct current voltage and connected to the switch activation circuit for energizing the switch activation circuit after a delay time from the connection of the source of alternating current voltage to the motor and for maintaining the switch activation circuit energized as long as charge exists on the start capacitor or the auxiliary start capacitor after the source of alternating current voltage is disconnected from the motor, wherein the control circuit comprises:
- 15 i. a timer/voltage sensor circuit having an input connected to the source of direct current voltage and an output, the timer/voltage sensor circuit comprising:
- 20 (a) a timer for measuring the time after the alternating current voltage is connected to the motor;
- 25 (b) a voltage sensor for determining the value of the voltage of the source of direct current voltage;
- (c) an interconnection between the voltage sensor and the timer so that the timer is adjusted based on the value of the voltage of the source of direct current voltage; and
- 30 (d) an output signal present on the output of the timer/voltage sensor circuit at the end of the elapsed time; and

- ii. a switch activation circuit driver connected to the output of the timer/voltage sensor circuit for energizing the switch activation circuit in response to the output signal from the timer/voltage sensor circuit after the elapsed time.

- 5 7. The motor starting device of Claim 6, wherein the timer/voltage sensor circuit further includes a the manual adjustment for varying the elapsed time.
- 8. The motor starting device of Claim 6, wherein the switch activation circuit driver is a multivibrator.
- 10 9. The motor starting device of Claim 6, wherein the starting device further comprises a switch protection circuit connected to the auxiliary start capacitor for maintaining the source of direct current voltage connected to the control circuit when the source of alternating current voltage is disconnected from the motor.